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ARMORED FORCE MEDICAL RESEARCH LABORATORY

FORT KNOX, KENTUCKY

DOCUMENT SECTION

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Project # 5 - CREW FATIGUE RESEARCH

Sub-Project # 5 - 8 Estimation of the Practical
Significance of Tank Noise

Subject: - Effect of Exposure to Tank Noise Upon Hearing
Acuity of Tank Crews

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ARMORED FORCE MEDICAL RESEARCH LABORATORY
Fort Knox, Kentucky

Project No. 5-8
File No. 741.22

January 20, 1943

EFFECT OF EXPOSURE TO TANK NOISE UPON HEARING
ACUITY OF TANK CREWS

1. PROJECT: Estimation of the Practical Significance of Tank Noise.

a. Authority - Letter of Commanding General, Headquarters Armored Force, Fort Knox, Kentucky, 400.112/6 GNOHD, dated September 24, 1942.

b. Purpose - To determine if tank crew members suffer any hearing loss from the noise in tanks.

2. DISCUSSION:

a. Under certain conditions prolonged exposure to high noise levels is known to produce permanent impairment of hearing, the damage frequently being greater at certain specific sound frequencies than at others. Shorter exposures to somewhat lower noise levels may result in temporary hearing loss or so-called fatigue deafness. Since the noise in tanks may reach relatively high levels it appeared desirable to determine whether or not the hearing of tank crews suffered impairment as a result of fairly long periods of operation. An opportunity to investigate the problem was presented in connection with extensive road and field tests of a group of M-4 A-3 medium tanks.

b. Methods -

1. Twenty-three (23) members of tank crews were tested throughout the audible band at intervals over a period of forty-one (41) days. Readings were taken approximately twelve (12) hours after exposure to avoid any effects of temporary fatigue deafness. Data from each man were plotted chronologically in order to demonstrate whether or not changes in hearing acuity occurred with time.

2. In addition, three men were studied for a period of several hours immediately following exposure for the purpose of observing fatigue deafness.

3. CONCLUSIONS:

a. No measurable hearing loss at any frequency was observed among the subjects during the test period (see Figs. 1 and 2 in the Appendix)

b. In general, no fatigue deafness was found in the three subjects who were tested immediately following a period of 5 hours exposure to tank noise. (see Fig. 3 in the Appendix)

c. On the basis of these tests, the likelihood of permanent damage to hearing from exposure to the noise in M-4 A-3 medium tanks appears to be remote if indeed existent.

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APPENDIX

I. Permanent changes in hearing -

a. Hearing acuity tests were made with the Maico Audiometer at the following frequencies: 128, 256, 512, 1024, 2048, 2896, 4096, 5792, 8192 and 11,584.

b. Subjects were tested in each ear separately, approximately 12 hours after tank exposure. Tests were conducted in a relatively quiet room.

c. Hearing loss (from the instrument "normal") to the nearest 5 db. was recorded at each frequency for each ear.

d. Typical curves are shown in Figs. 1 and 2. In no subject was there any consistent evidence of change in hearing at any tone frequency throughout the test period which extended over 41 days and included up to 8 hours of exposure to tank noise each day.

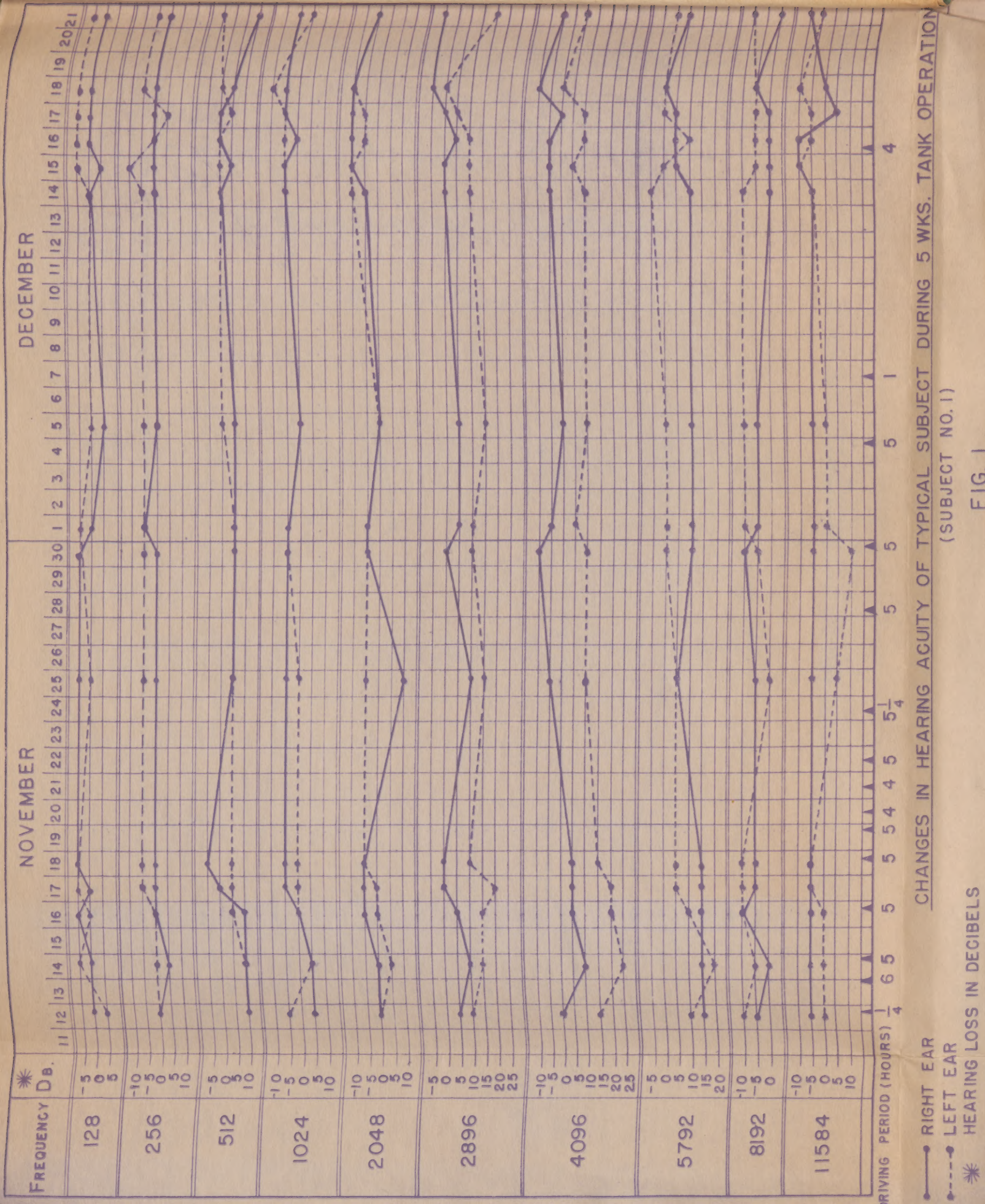
II. Fatigue deafness -

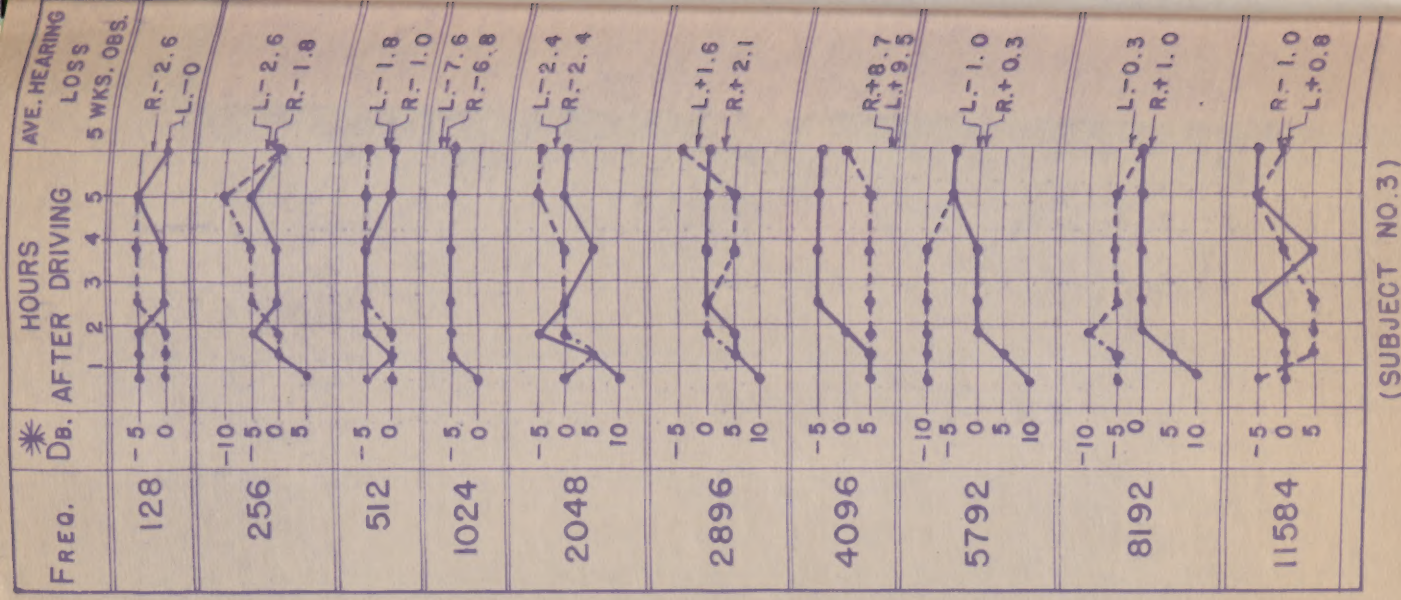
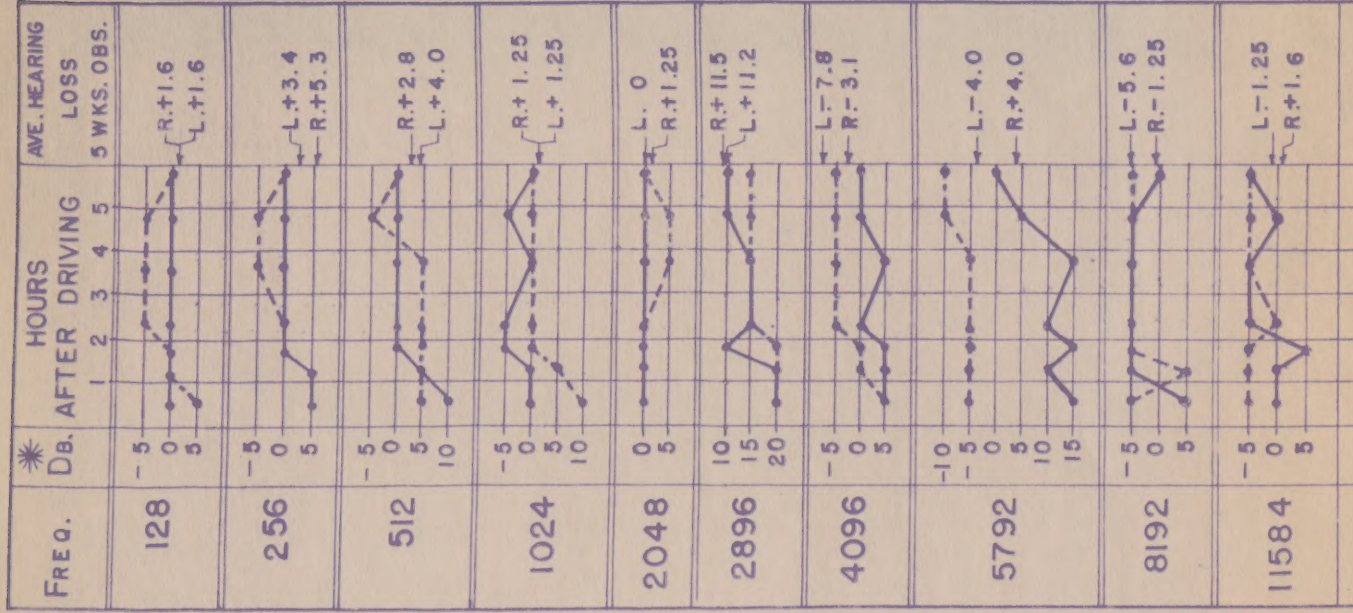
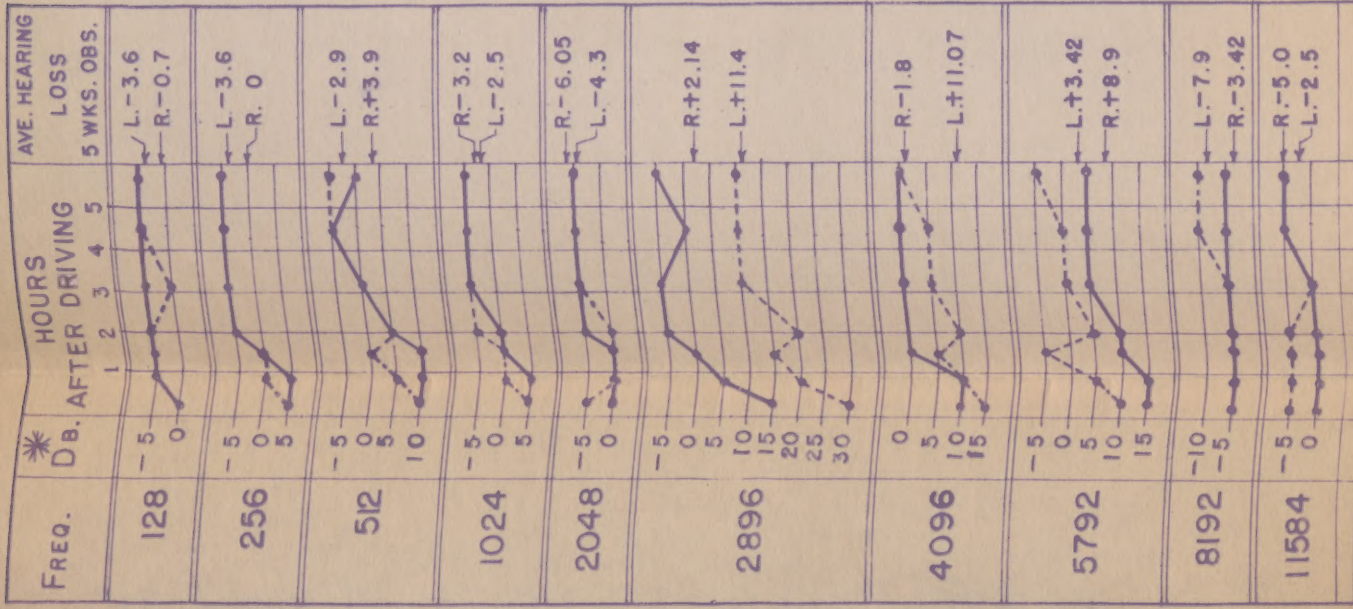
a. Hearing tests were conducted as above, except that tests were started approximately 30 minutes following a period of 5 hours continuous tank driving. Testing was repeated at intervals for 5 hours.

b. Curves for the three subjects are shown in Fig. 3 and, for comparison, the averages of readings (at each frequency) obtained in the previous tests are also shown.

c. It will be observed that no evidence of fatigue deafness was found except at frequencies 512 and 2896 for subject #1 and frequencies 5792 for subjects #2 and 3. In these cases the departure from the subjects normal did not exceed 15 db, which is not striking.

d. Subjectively, the only symptom reported was slight ringing in the ears.





TEMPORARY HEARING LOSS IMMEDIATELY AFTER 5 HOURS TANK OPERATION
(THREE SUBJECTS)

— RIGHT EAR
- - - LEFT EAR
* HEARING LOSS IN DECIBELS

(FIG. 3)

